### Introduction

- Biodegradable plastic mulch (BDM) can substitute conventional polyethylene mulch (PE).
- BDM can be soil incorporated after usage, alleviating disposal costs.
- Microclimate and BDM impact on agricultural soil ecosystems needs to be evaluated.

### Objectives

- Examine light, temperature, and moisture flow dynamics in BDM plots.
- Evaluate BDM effects on soil quality and potential for ground water pollution.

### Materials and Methods

**Locations:** Established in 2015 at Knoxville, TN and Mount Vernon, WA.

**Soil quality:** Tested soil biological, physical, and chemical parameters (Table 1).

**Treatments:** Four BDMs, plus bare ground, paper mulch, and PE as controls.

**Test crop:** Pie pumpkin (Cucurbita pepo)

**Instrumentations:**

- Decagon STM sensors at 10 and 20 cm soil depths.
- Hobo Pendant Temperature/Light Data Loggers at soil surface or directly underneath mulches (WA only).
- Drain Gauge G3 at 55 cm depth (WA only).
- Suction lysimeters at 30 cm depth (TN only).

### Results

**Microclimate:**

- Soil temperature was less variable to depth increase in all the mulch treatments (Fig. 1). The maximum soil temperature at 0, 10, 20 cm soil depths was 54.8, 34.3, and 30.0 °C, respectively.
- Soil water content differed in mulch treatments at both sites. Bare ground was generally dryer throughout the season at Mount Vernon, WA and during early crop season at Knoxville, TN (Fig. 2).
- The mulches reduced light penetration by more than one hundred thousand lux (Fig. 3). Overall, the PE mulch treatment was the most effective in preventing light penetration.

**Soil quality:** No effects of BDM on the soil quality parameters tested after first year cropping season.

**Drainage:** No water drainage during the growing period.

### Conclusions

Microclimate varies with mulch type, which affects crop growth and productivity. There were no effects of the mulch treatments on soil quality.

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